

Additionally, the present amendment adds claim 15-24 which are further responsive to the matters raised by the Examiner under §§ 103(a) and 112.

In the Office Action of April 24, 2002, the Examiner noted several deficiencies with regard to § 112 in the language of claims 1-14. Applicant has made the required, and other, changes and asserts that the claims are now in proper form for allowance. Added claims 15-24 reflect the changes made to the examined claims.

The Office Action of April 24, 2002 indicated that claims 1-13 are rejected under 35 U.S.C. § 103(a) as unpatentable over Pajunen et al U.S. Patent No. 4,915,959 ("Pajunen") in view of The Practical Brewer (pgs. 246-48).

The gist of the present invention, as recited in the amended claims, is to provide a continuous method and bio-reactor for the maturation of beer after fermentation through the use of wood carrier particles within a bio-reactor. The invention thus comprises a significant, efficient, and economical technique for the maturation of beer.

Pajunen teaches a method for continuous maturation of beer. The carrier of choice noted in the Pajunen reference is a DEAE cellulose resin column. No other carrier material is disclosed or suggested.

The Practical Brewer (pgs. 246-248) describes a non-continuous batch process for the fermentation of beer. That process is not the claimed process, or for that matter the Pajunen process, both of which are for the continuous maturation of beer. Further, the process of the reference includes the addition of large wood "chips" during fermentation. However, "chips" is a complete misnomer for boards or logs that are two feet long, four inches wide and 1/4 inch thick, as described in the reference. Such elements are clearly not "particles" of the maximum dimensions called for in the application claims. Nor would such boards be suitable for use in a reactor column as described in Pajunen.

Significantly, the boards are washed after every batch so there is no immobilization of yeast on the boards, also as called for in the claims. Nor does The Practical Brewer disclose anything about yeast attaching to the boards. In fact, The

Practical Brewer is not directed to the immobilization of yeast nor to a continuous maturation process of beer through the use of immobilized yeast.

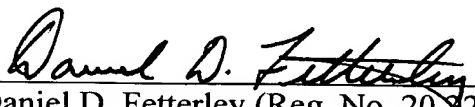
Inasmuch as the Pajunen reference does not disclose any carrier material other than DEAE cellulose resin for the maturation of beer, and as The Practical Brewer does not disclose maturation or the use of wood in a form suitable for use in Pajunen, there is nothing in the references teaching or suggesting their combination. Even if the references could be combined, The Practical Brewer is further deficient in that it contains no teaching of the use of wood in a continuous process utilizing immobilized yeast.

In summary, there is no suggestion in either Pajunen or The Practical Brewer to provide a method for maturing beer that includes passing fermented beer into a bio-reactor that is filled with wood carrier particles having yeast immobilized thereon. Further, neither reference teaches the specific aspects of the claimed invention recited in the dependent claims, such as the use of 1-100 mm wood carrier particles.

Withdrawal of the § 103(a) rejection is respectfully requested.

For all the reasons advanced above, applicant respectfully submits that the application is in proper condition for allowance and that action is earnestly solicited.

Respectfully submitted,

  
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## MARKED-UP CLAIMS

Serial No. 09/423,004

Please amend claim 1 as follows:

1. (amended) ~~Continuous~~ A method for the continuous maturation of beer after main fermentation, ~~in which method comprising the steps of: passing the~~ unmaturation beer, after removal of yeast and a heat treatment, ~~is passed into~~ through a bio-reactor filled with a carrier material with yeast immobilised on it, ~~characterized in that~~ the carrier material ~~mainly consists of wooden~~ comprising wood particles, ~~and/or similar particles.~~

Please amend claim 2 as follows:

2. (amended) ~~Method~~ The method as defined in claim 1, ~~characterised in that wherein~~ said particles are chip-like or stick-like particles ~~or particles shaped like any regular or irregular bodies, whose dimension is of the order of 1-100 mm, advantageously 1-50 mm, preferably 2-2 mm.~~

Please amend claim 3 as follows:

3. (twice amended) ~~Method~~ The method as defined in claim 1, ~~characterised in that wherein~~ the ~~wooden~~ wood particles comprise ~~have been produced from~~ deciduous wood.

Please amend claim 4 as follows:

4. (twice amended) ~~Method~~ The method as defined in claim 1, ~~characterised in that wherein~~ the ~~wooden~~ wood particles comprise ~~have been produced from~~ coniferous wood.

Please amend claim 5 as follows:

5. (twice amended) ~~Method~~ The method as defined in claim 1, ~~characterised in that wherein~~ the ~~wooden~~ wood particles have been produced from tropical gramineous plants.

Please amend claim 6 as follows:

6. (twice amended) ~~Method~~ The method as defined in claim 1, ~~characterised in that wherein~~ the yeast used in the bio-reactor ~~reactor~~ is conventional brewing yeast ~~and/or~~ and highly flocculable yeast.

Please amend claim 7 as follows:

7. (twice amended) ~~Method~~ The method as defined in claim 1, ~~characterised in that wherein~~ the amount of yeast in the bio-reactor ~~reactor~~ is  $10^6 - 10^9$  cells/ $1\text{ cm}^3$  of particles.

Please amend claim 8 as follows:

8. (twice amended) ~~Method~~ The method as defined in claim 1, ~~characterised in that wherein~~ the temperature in the bio-reactor ~~reactor~~ is  $5 - 25\text{ }^{\circ}\text{C}$ , preferably  $5 - 20\text{ }^{\circ}\text{C}$ .

Please amend claim 9 as follows:

9. (twice amended) ~~Method~~ The method as defined in claim 1, ~~characterised in that wherein~~ the flow rate of unmaturing beer through the bio-reactor ~~reactor~~ is ~~of~~ on the order of  $0.05 - 2$  times the bio-reactor ~~reactor~~ volume / h, preferably  ~~$0.5 - 1$  reactor volume / h.~~

Please amend claim 10 as follows:

10. (twice amended) ~~Method~~ The method as defined in claim 1, ~~characterised in that further including the step of regenerating the particles after use are regenerated, preferably~~ using hot water or steam.

Please amend claim 11 as follows:

11. (twice amended) ~~Method~~ The method as defined in claim 1, ~~characterised in that further including the step of treating the particles are subjected to a treatment, preferably a water cooking treatment or ethanol extraction treatment, prior to immobilisation of the yeast.~~

Please amend claim 12 as follows:

12. (amended) ~~Method~~ The method as defined in claim 11, ~~characterised in that that~~ wherein the particles are washed.

Please amend claim 13 as follows:

13. (amended) ~~Continuous~~ A continuous beer maturation reactor ~~comprising, which is~~ an upright column-type flow-through reactor containing one or more sieves, intermediate bottoms or flanges, and ~~which is filled with~~ a carrier material filler with yeast immobilised on it, characterised in that ~~the carrier material comprising mainly consists of wooden wood particles, and/or similar particles.~~

Please amend claim 14 as follows:

14. (amended) ~~Maturation~~ The reactor as defined in claim 13, ~~characterised in that~~ wherein said particles are chip-like or stick-like particles ~~or particles shaped like any regular or irregular bodies whose dimension is mainly of the order of 1 - 100 mm, preferably 1 - 50 mm.~~

Please add the following claims:

15. The method as defined in claim 1 wherein a maximum dimension of the particles is on the order of 1-100 mm.

16. The method as defined in claim 15 wherein a maximum dimension of the particles is on the order of 1-50 mm.

17. The method as defined in claim 15 wherein a maximum dimension of the particles is on the order of 2-20 mm.

18. The method as defined in claim 8 wherein the temperature in the bio-reactor is 5-20°C.

19. The method as defined in claim 9 wherein the flow rate of unmaturred beer through the bio-reactor is on the order of 0.5-1 times the bio-reactor volume.

20. The method as defined in claim 11 wherein the treating step is further defined as subjecting the particles to one of a water soaking treatment or ethanol extraction treatment prior to immobilization of the yeast.

21. The method as defined in claim 1 further including the steps of removing yeast from the unmatured beer and heating the beer prior to passing the beer through the bio-reactor.

22. The reactor as defined in claim 13 wherein a maximum dimension of the particles is on the order of 1-100 mm.

23. The reactor as defined in claim 22 wherein a maximum dimension of the particles is on the order of 1-50 mm.

24. The reactor as defined in claim 22 wherein a maximum dimension of the particles is on the order of 2-20 mm.